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|---|---------------------------------------|--------------------------------------|--|
| <p align="center">Notice of Allowability</p> | Application No. 09/927,118 | Applicant(s) PIERCE ET AL. | |
| | Examiner Alysa N. Brautigam | Art Unit 2676 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 22 October 2004.
2. ☒ The allowed claim(s) is/are 1-9 and 11-58.
3. ☒ The drawings filed on 10 August 2001 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|--|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413), Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

DETAILED ACTION

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

2. Authorization for this examiner's amendment was given in a telephone interview with Anne McCracken (Reg. No. 42,858) and Trent Grover on 14 and 15 February 2005.

3. The application has been amended as follows:

With respect to **Claim 1**, line 11:

- AFTER – “second combined equirectangular image” –
INSERT -- “ that is different from said first combined equirectangular image” –

With respect to **Claim 10**:

- The claim is **CANCELED**.

With respect to **Claim 13**, line 2:

- BETWEEN – “first combined” and “image” –
INSERT -- “equirectangular ” –

With respect to **Claim 13**, line 2:

- BETWEEN – “second combined” and “image” –
INSERT -- “equirectangular ” –

With respect to **Claim 14**, line 2:

- BETWEEN – “first combined” and “image” –
INSERT -- “equirectangular ” –

With respect to **Claim 14**, line 4:

- BETWEEN – “second combined” and “image” –
INSERT -- “equirectangular ” –

With respect to **Claim 15**, line 2:

- BETWEEN – “first combined” and “image” –
INSERT -- “equirectangular ” –

With respect to **Claim 15**, line 4:

- BETWEEN – “second combined” and “image” –
INSERT -- “equirectangular ” –

With respect to **Claim 18**, line 1:

- BETWEEN – “first combined” and “image” –
INSERT -- “equirectangular ” –

With respect to **Claim 18**, line 2:

- BETWEEN – “second combined” and “image” –
INSERT -- “equirectangular ” –

With respect to **Claim 19**, line 14:

- AFTER – “combined equirectangular image” –

INSERT -- " that is different from said first combined equirectangular
image" –

With respect to **Claim 20**, line 2:

- BETWEEN – "first combined" and "image" –
INSERT -- "equirectangular " –

With respect to **Claim 20**, line 2:

- BETWEEN – "second combined" and "image" –
INSERT -- "equirectangular " –

With respect to **Claim 21**, line 1:

- BETWEEN – "first combined" and "image" –
INSERT -- "equirectangular " –

With respect to **Claim 22**, line 1:

- BETWEEN – "first combined" and "image" –
INSERT -- "equirectangular " –

With respect to **Claim 23**, line 8:

- AFTER – "second combined equirectangular image" –
INSERT -- " that is different from said first combined equirectangular
image" –

With respect to **Claim 29**, line 3:

- BETWEEN – "first combined" and "image" –
INSERT -- "equirectangular " –

With respect to **Claim 30**, line 10:

- AFTER – “equirectangular image” –
INSERT -- “ that is different from said first combined equirectangular image” –

With respect to **Claim 39**, lines 1 and 2:

- BETWEEN – “first combined” and “image” –
INSERT -- “equirectangular ” –

With respect to **Claim 39**, line 3:

- BETWEEN – “second combined” and “image” –
INSERT -- “equirectangular ” –

With respect to **Claim 41**, line 5:

- AFTER – “second monoscopic equirectangular image” –
INSERT -- “ that is different from said first monoscopic equirectangular image” –

With respect to **Claim 42**, line 2:

- BETWEEN – “first monoscopic” and “image” –
INSERT -- “equirectangular ” –

With respect to **Claim 42**, line 2:

- BETWEEN – “second monoscopic” and “image” –
INSERT -- “equirectangular ” –

With respect to **Claim 55**, lines 1-2:

- BETWEEN – “first combined” and “image” –
INSERT -- “equirectangular ” –

With respect to **Claim 55**, line 3-4:

- BETWEEN – “second combined” and “image” –
INSERT -- “equirectangular ” –

4. Amended claim 1 should read as follows:

1. (Currently Amended) An imaging system comprising:

- (a) a first image capture device;
- (b) a second image capture device;
- (c) a third image capture device;
- (d) means for combining at least a first portion of a first image captured with said first image capture device with a portion of a second image captured with said second image capture device, to produce a first combined equirectangular image;

(e) means for combining at least a second portion of said first image with at least a portion of a third image captured with said third image capture device to produce a second combined equirectangular image that is different from said first combined equirectangular image,

wherein said second combined equirectangular image does not comprise a majority of said first portion of said first image.

5. Amended claim 10 should read as follows:

10. (Cancelled)

6. Amended claim 13 should read as follows:

13. (Currently Amended) The imaging system of claim 1, further comprising means for displaying said first combined equirectangular image and said second combined equirectangular image as a stereoscopic image.

7. Amended claim 14 should read as follows:

14. (Currently Amended) The imaging system of claim 1, further comprising means for combining said first combined equirectangular image with a sufficient plurality of images to produce a first combined panoramic image, representing at least about 90 degrees of a scene, and combining said second combined equirectangular image with a sufficient plurality of images to produce a second combined panoramic image, representing about 90 degrees of a scene, and means for displaying said first combined panoramic image and said second combined panoramic image in a manner which produces a stereoscopic, panoramic effect.

8. Amended claim 15 should read as follows:

15. (Currently Amended) The imaging system of claim 1, further comprising means for combining said first combined equirectangular image with a sufficient plurality of images to produce a first combined panoramic image, representing at least about 180 degrees of a scene, and combining said second combined image with a sufficient plurality of images to produce a second combined equirectangular panoramic image, representing about 180 degrees of a scene, and means for displaying said first

combined panoramic image and said second combined panoramic image in a manner which produces a stereoscopic, panoramic effect.

9. Amended claim 18 should read as follows:

18. (Currently Amended) The imaging system of claim 1, further combining said first combined equirectangular image and said second combined equirectangular image with a digital image, to produce a stereoscopic image within said digital image.

10. Amended claim 19 should read as follows:

19. (Currently Amended) An imaging system comprising:

- (a) a first image capture device having a first orientation;
- (b) a second image capture device having a second orientation different from said first orientation;
- (c) a third image capture device having a third orientation different from said second orientation;
- (d) a fourth image capture device having a fourth orientation different from said third orientation;
- (e) means for combining a first image captured with said first image capture device with a second image captured with said second image capture device to produce a first combined equirectangular image; and
- (f) means for combining a third image captured with said third image capture device with a fourth image captured with said fourth image capture device to produce a

second combined equirectangular image that is different from said first combined equirectangular image.

11. Amended claim 20 should read as follows:

20. (Currently Amended) The imaging system of claim 19, further comprising means for displaying said first combined equirectangular image and said second combined equirectangular image as a stereoscopic image.

12. Amended claim 21 should read as follows:

21. (Currently Amended) The imaging system of claim 19, wherein said first combined equirectangular image displays at least about 180 degrees of a scene.

13. Amended claim 22 should read as follows:

22. (Currently Amended) The imaging system of claim 19, wherein said first combined equirectangular image represents at least about 300 degrees of a scene.

14. Amended claim 23 should read as follows:

23. (Currently Amended) A method for producing a stereoscopic image comprising:

- (a) obtaining a first image;
- (b) obtaining a second image;
- (c) obtaining a third image;

(d) combining a first portion of said first image with a portion of said second image to produce a first combined equirectangular image;

(e) combining a second portion of said first image with a portion of said third image to produce a second combined equirectangular image that is different from said first combined equirectangular image; and

(f) displaying said first combined image and said second combined equirectangular image in a manner which produces a stereoscopic image.

15. Amended claim 29 should read as follows:

29. (Currently Amended) The method of claim 23, further comprising:
feathering overlapping edges of an image in an image buffer by degrading visibility of pixels in an overlap area prior to combining the image into the first combined equirectangular image.

16. Amended claim 30 should read as follows:

30. (Currently Amended) An imaging system comprising:
a first image capture unit to capture a first image;
a second image capture unit to capture a second image;
a third image capture unit to capture a third image; and
a processing unit operationally coupled to the first, second, and third image capture units to receive the first, the second, and the third images, wherein a first portion of the first image can be combined with a portion of the second image to provide a first combined equirectangular image, wherein a second portion of the first image can

be combined with a portion of the third image to provide a second combined equirectangular image that is different from said first combined equirectangular image, and wherein the first and second combined equirectangular images can be displayed to provide a stereoscopic image.

17. Amended claim 39 should read as follows:

39. (Currently Amended) The imaging system of Claim 30, wherein the first combined equirectangular image is combined with a sufficient plurality of images to produce a first combined panoramic image, representing about 90 degrees of a scene, and wherein the second combined equirectangular image is combined with a sufficient plurality of other images to produce a second combined panoramic image, representing about 90 degrees of the scene, and wherein said first combined panoramic image and said second combined panoramic image are displayed to provide a stereoscopic, panoramic image.

18. Amended claim 41 should read as follows:

41. (Currently Amended) An imaging system comprising:
an image capture unit to provide an image; and
a processing unit coupled to the image capture unit to receive a first portion of said image to provide a first monoscopic equirectangular image, and to receive a second portion of said image to provide a second monoscopic equirectangular image that is different from said first monoscopic equirectangular image.

19. Amended claim 42 should read as follows:

42. (Currently Amended) The imaging system of Claim 41, further comprising means for displaying said first monoscopic equirectangular image and said second monoscopic equirectangular image as a stereoscopic image.

20. Amended claim 55 should read as follows:

55. (Currently Amended) The imaging system of Claim 30, wherein the first combined equirectangular image is combined with a sufficient plurality of images to produce a first combined panoramic image, representing a 360 degree panoramic monoscopic image, and wherein the second combined equirectangular image is combined with a sufficient plurality of other images to produce a second combined panoramic image, representing a 360 degree panoramic monoscopic image, and wherein said first combined panoramic image and said second combined panoramic image are displayed to provide a stereoscopic, panoramic image.

Drawings

21. The drawings were received on 10 August 2001. These drawings are acceptable.

Claim Objections

22. In regards to claim 29, applicant's amendment, see page 6 of the amended claims, filed 22 October 2004, with respect to the Claim Objection has been fully considered and are persuasive. The objection to claim 29 has been withdrawn.

Claim Rejections - 35 USC § 112

23. In regards to claim 10, applicant's amendment, see page 3 of the amended claims, filed 22 October 2004, with respect to the 35 USC § 112 Claim Rejection has been fully considered and is persuasive. The objection to claim 10 has been withdrawn.

24. In regards to claim 51, applicant's amendment, see page 10 of the amended claims, filed 22 October 2004, with respect to the 35 USC § 112 Claim Rejection has been fully considered and is persuasive. The objection to claim 51 has been withdrawn.

Allowable Subject Matter

25. Claims 1-9 and 11-58 are allowed.

26. The following is an examiner's statement of reasons for allowance:

27. With respect to claim 1, prior art fails to teach or suggest, either alone or in combination, an imaging system comprising first, second, and third image capture devices wherein the images from these devices are combined such that a first portion of the first image is combined with the second image and a second portion of the first image is combined with the third image to produce **a first and a second combined equirectangular image** which are separate and distinct from one another.

28. With respect to claim 19, prior art fails to teach or suggest, either alone or in combination, an imaging system comprising first, second, third, and fourth image capture devices wherein the images from these devices are combined such that the first image is combined with the second image to produce a **first combined equirectangular image** and the third image is combined with the fourth image to produce a **second combined equirectangular image** which is separate and distinct from the first combined equirectangular image.

29. With respect to claim 23, prior art fails to teach or suggest, either alone or in combination, an imaging system comprising first, second, and third image capture devices wherein the images from these devices are combined such that a first portion of the first image is combined with the second image and a second portion of the first image is combined with the third image to produce a **first and a second combined equirectangular image** which are separate and distinct from one another.

30. With respect to claim 30, prior art fails to teach or suggest, either alone or in combination, an imaging system comprising first, second, and third image capture devices wherein the images from these devices are combined such that a first portion of the first image is combined with the second image and a second portion of the first image is combined with the third image to produce a **first and a second combined equirectangular image** which are separate and distinct from one another.

31. With respect to claim 40, prior art fails to teach or suggest, either alone or in combination, a single image capture unit coupled to a processing unit capable of receiving a first portion of a **single image** to provide a **first monoscopic**

quirectangular image and to receive a second portion of **said single image** to provide a **second monoscopic equirectangular image** which is separate and distinct from the first.

32. A search of prior art found similar art although not entirely as claimed.

33. Gilbert et al. (6,654,019) disclose a method for forming a full panorama image from multiple fisheye images comprising the steps of capturing a plurality of fisheye images, and seaming said plurality of fisheye images together to form a full image spherical view, said seaming step including overlapping portions of at least two of said plurality of fisheye images. Gilbert does not disclose a plurality of image capture devices and, in fact, only discloses a single camera. While Gilbert discloses the overlap of the plurality of fisheye images to achieve an equirectangular projection, Gilbert does not teach or suggest the captured images are combined to produce a first and second combined equirectangular image. Further, Gilbert does not teach wherein only a portion of the first image is used in combination with the second and third images and Gilbert teaches away from a plurality of combined equirectangular images by stating "the single view images are seamed into a panorama and transformed to equirectangular format." In other words, Gilbert only goes so far as to combine, in totality, a plurality of image to achieve a single panoramic image. Related patents include 6,337,683, and 6,323,858.

34. Golin et al. (6,683,608) discloses a method and apparatus for generating views of an environment with proper perspective and parallax. This invention captures panoramic views at many points in the environment, preferably by using fisheye lenses

with sub-hemispherical fields of views to yield overlapping fisheye images that are seamed together, and stores them as planar polygons, which have been extended to include imagery occluded at their viewing position but visible at nearby points. Three-dimensional information on the environmental source of these polygons is determined and stored, enabling the playback system to simulate parallax as well as to produce stereographic images. Given a location and orientation in the environment, the playback system finds a nearby capture point and translates the polygons at that point to the specified location, producing an image. It then rotates that image to the desired orientation and then displays it. While Golin discloses the overlap of the plurality of fisheye images to achieve an equirectangular projection, Gilbert does not teach or suggest the captured images are combined to produce a first and second combined equirectangular image. Further, Golin does not teach wherein only a portion of the first image is used in combination with the second and third images and Golin teaches away from a plurality of combined equirectangular images by stating "the single view images are seamed into a panorama and transformed to equirectangular format." In other words, Golin only goes so far as to combine, in totality, a plurality of image to achieve a single panoramic image. Related patents include 6,031,540.

35. Peleg et al. (6,665,003) discloses many of the features claimed by Applicant as noted by the Examiner in the Non-Final Rejection dated 4 May 2004 including obtaining first, second, and third images; combining a first portion of a first image with a portion of a second image to produce a first combined image and combining a second portion of said first image with a portion of a third image to produce a second combined image.

However, Peleg does not teach or suggest that these images are combined to produce an equirectangular image. Further, there is no suggestion in the prior art to cause one to combine references to achieve a system or method wherein the combination of image portions produces equirectangular images. With respect to the Golin and Gilbert citations above, Golin and Gilbert disclose wherein "the single view images are seamed into a panorama and transformed to equirectangular format." Golin and Gilbert do not disclose or suggest image slices or image portions being used or being capable of being used to achieve the same effect nor do any of the citations suggest a reason to combine.

36. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."


Conclusion

37. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alysa N. Brautigam whose telephone number is 703-305-8631. The examiner can normally be reached on 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on 703-308-6829. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

anb



Kee M. Tung
Primary Examiner